FLIGHT ANXIETY AMONG NORWEGIAN AIRLINE PASSENGERS

In relation to other phobias and the terror act at September 11, 2001

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ABSTRACT

Aims: To study 1) the prevalence of flight anxiety among Norwegian airline passengers according to sosiodemographic variables 2) situations that make concern during flights and situations not related to flying and 3) whether passengers feel more afraid after the terror act of September 11, 2001.
Methods: A questionnaire was distributed randomly to passengers and completed during domestic flights in Norway in 2002. There were 484 responses (48% women, mean age 41 years and 52% men, mean age 43 years). To asses flight phobia, a six point scale was used, from 0= not afraid at all, to 4= always very afraid, but never cancel flights because of that and 5= always very afraid, and sometimes avoid flying because of that. Grade 4 and 5 were considered flight phobia. A 10-cm visual analogue scale (VAS) was used to measure the degree of anxiety in different situations during flights and in situations other than flying. (0 = no anxiety and 10 = maximum anxiety.)
Results: There were 12 women (5,1%) and one man (0,3%) with flight phobia, seven (1,5%) with grade 4 and six (1,3%) with grade 5. There were 50,8% who were not afraid at all. However, 22 (4,5%) had cancelled flights because of anxiety during the last two years. There were 84 (17,4%) who answered the question about how many years they had been afraid, and 70% of them had been afraid for more than 10 years. Situations that make most concern during flights are turbulence, terrorism and high jacking. In situations other than flying, both men and women are most afraid of heights. After September 11, 48% were not more afraid, 38% a little more, 10% to a moderate degree, 3% to a rather much and 2% very much. The passengers are not more afraid in 2002 than in 1986.
Conclusion: About 3% of Norwegian passengers have flight phobia. Women who fly are significantly more concerned during flights than men. They are also more afraid than men in situations other than flying. The impact of the terror act September 11, 2001 is significant, but rather moderate. The prevalence of flight anxiety among Norwegian airline passengers is the same in 2002 and 1986.

INTRODUCTION

There are only a few studies made on prevalence of flight anxiety, especially among passengers. Most of the studies I find are studies based on investigations in the population, where the questionnaires are mailed to the subjects. In connection with this study, I sought for previous articles in Google scholar and the databases PubMed and Psych.Info. Only a few articles were found and most of them of an older date. We only found one article made among passengers, Ekeberg et al. (1). Some studies are done on prevalence of flight anxiety among aircrew members. On the other hand, there are many studies on different kinds of treatment for those who suffer from flight anxiety and flight phobia. The subjects then are chosen beforehand among subjects that have flight phobia. This is not a topic for this study.

First some definitions; Phobias are defined as unreasonable fears, associated with the avoidance of objects or situations, that interferes with life. Phobias are categorized as specific, social or agoraphobias (2). Flight anxiety, defined as anxious feelings related to flying, ranging from apprehension to incapacity to go by plane, Ekeberg et al. (1)

In the study made among passengers, Ekeberg et al. (1) found that 48% of the respondents reported some flight anxiety and 2% were defined as flight phobics. Females were significantly more affected than men. Another study of Ekeberg (3) on prevalence of flight anxiety in Norway, found that some degree of flight anxiety was reported by 46%, and 8% have flight phobia. Flight phobia here defined for those who reported “always very afraid, but never avoid flying because of it” to those who “never fly because of flight anxiety”, of those were 14% females and 3% males. A study from Sweden, Nordlund (4), found that 20-30% of the Swedish population experienced considerable discomfort on each flight, 50% were apprehensive about flying and 10% did not dare to fly at all. A study of flight phobia among Icelanders, Arnarson (5), found that less than 10% of male and about a quarter of female Icelanders suffer from intense fear of flying. Wilhelm et al (6) says that Boeing estimates that 20-30% of the US population is apprehensive about flying. Fredrikson et al (7) found the point prevalence for DSM-III-R Simple phobia (flying) to be 2,6%. Women reported significantly more intense fear than men for all separate items and groups of items, included fear of flying. An old American study from 1969, Agras et al. (8), found that 20% had a moderate and 10% an intense fear of flying. Women were more affected than men. A German study, Mühlberger et al. (9), says that fear of flying is a common problem in modern societies and that 15% of the german population has this fear and that an additional 20% are apprehensive while flying.

What kinds of situations make discomfort during flights and do the passengers also feel anxiety in situations other than flying? Ekeberg et al. (1) and Ekeberg et al. (3) found that turbulence caused most discomfort. In situations other than flying, heights caused far the most discomfort.

Another interesting topic to study is whether occurrences like the terror act at September 11, 2001 made passengers more afraid of flying. Many articles are written about September 11, but we only found one related article that had studied fear of flying after September 11. Mühlberger et al. (11), says that the number of German airline passengers declined sharply in the months following the attacks. Most airlines in the US and Europe reported a noticeable decline in the number of passengers after the attacks, probably a consequence of this having been a prominent topic in the US and European media. In Germany there was a 50-80% increase in cancellations due to passengers reporting sick in the four months after the attacks.

Was this a result of increased fear of flying? Because they had coincidentally collected data for the standardization of the German version of the Fear of Flying Scale in the months before September 11, they were able to examine whether the prevalence of fear of flying increased in Germany as a consequence of the attacks. They found no evidence for an increase in fear of flying. They did not observe an increase in avoidance of flights, other specific flying-related fears, or trait anxiety in the wake of the September 11 attacks. Some studies show a decline in airline passengers after September 11, among those Ito et al. (12) and Gigerenzer (13).

The aims of this study are then to investigate the following approaches among Norwegian airline passengers:
1) The prevalence of flight anxiety among Norwegian airline passengers according to sociodemographic variables.
2) What kinds of situations make discomfort during flights?
-Anxiety in situations not related to flying?
-The passengers' opinion about frequency of flight accidents and how many percent that perishes.
-Passengers confidence about airline companies and airports doing enough to ensure safety.
3) Whether passengers feel more afraid after the terror act of September 11, 2001.
4) Are Norwegian airline passengers more afraid of flying now than in 1986?

METHODS

Participants

The study was conducted during the period 27.–30. October 2002, in cooperation with the Norwegian airline Braathens. This is the same airline in the last study in 1986. (At present SASBraathens). 15 different flights were randomly drawn out among Norwegian domestic flights. They were considered to cover unequal days and all hours. On each flight 50 questionnaires were to be distributed. The goal was to distribute at least 500 questionnaires. The responsibility for distributing 50 questionnaires on each flight was given to the cabin crew. The questionnaires were given to randomly selected passengers while they were on board. The cabin crews were informed to try to limit the distribution to passengers in the age group of 18-70 years. Further they should choose some passengers on the aile seats , some in the middle of the plane, some sitting at the window, some at the back of the plane and so on. If there were less than 50 passengers on board, the cabin crews should note how many questionnaires they had distributed, so the response rate could be calculated. Not completed questionnaires should also be returned. The questionnaires were collected by the cabin crew after landing. The cabin crew received written information on how all of this should take place.

The passengers got written information about the purpose of the study and that it was approved by the leadership of Braathens. The written information to the passengers pointed out that it was voluntary to take part in the study, and that all the answers would be handled anonymously. The passengers were informed that the questionnaire should be filled out during the flight and be delivered to the cabin crews before the passengers left the plane. If this for practical reasons was not possible, they could return the questionnaire by mail.

Questionnaire

The questionnaire contained 47 questions.
10 items covered background variables like sex, age, marital and occupational status, number of children and flight habits.
A 10-cm visual analogue scale (VAS) was used to measure the degree of anxiety in order that 21 different situations might happen in connection with a flight. Examples; fire in an engine, engine trouble, extraneous matter in the engine, unknown sounds, terror acts etc. The end points (0 = no anxiety and 10 = maximum anxiety) were verbally anchored, and were identical for all items measured by the scale.
In addition, the subjects were asked to indicate their anxiety on the VAS for six situations not related to flying. These other possible phobias were; riding elevators, big gatherings, enclosed spaces, walking across spaces, traveling by bus/train and heights.
Concerning the degree of flight anxiety, the passengers were asked to choose one of six alternatives, ranging from "not afraid at all" to "always very afraid, and sometimes avoid flying because of that". Those who were afraid should also answer three questions concerning how long they had been afraid, a special frightening experience with a flight and more afraid after having children.
All passengers were asked if they had become more afraid of flying after the terror acts at the World Trade Center and Pentagon, USA, 11.09.2001, at what degree they feel that the airport staff and airline companies do enough to ensure safety, and whether they had become more afraid after having children.
Finally, there were two items about air safety. The passengers should choose one of seven alternatives and answer a question of how often they believed that a passenger aircraft in scheduled traffic crashed and state how many percent onboard that they believe perish in an average crash.

Procedure

On the 15 flights, 606 questionnaires were handed out, between 19-50 questionnaires on each flight. On the flight where only 19 questionnaires were handed out, all of the questionnaires were filled out and delivered to the cabin crew. This was the only flight with response rate 100%. From the other 14 flights between 17-44 questionnaires were filled out.

484 participants (response rate 79,9%)
233 females (48,1%) – mean age 40,8 years, range 13-78
251 males (51,9%) – mean age 43,0 years, range 18-78

A six step scale was used to obtain a measure of the degree of flight anxiety ranging from:
"Not afraid at all" = flight anxiety 0
"Sometimes a little afraid" = grade 1
"Always a little afraid" = grade 2
"Sometimes very afraid" = grade 3
"Always very afraid, but never cancel flights because of that" = grade 4
"Always very afraid, and sometimes avoid flying because of that" = grade 5
Grade 4 and 5 were considered flight phobia.

230 (47,5%) of the passengers were married, 91 (18,8%) cohabitant, 102 (21,1%) unmarried. The remaining passengers were engaged, separated, divorced, widow and others (6,7%). 28 of the passengers had not stated marital status.

140 (28,9%) of the passengers had no children. 303 (62,6%) had 1-3 children, while the rest of the passengers had 4-6 children or not stated the question.
404 (83,5%) were in regular work, 32 (6,6%) students, 20 (4,1%) retired. The rest of the passengers were housewife, disabled, out of work and those who had not answered the question.
291 (60,5%) of the passengers had to fly in connection with work. 45,0% of the women and 74,8% of the men *(table 1).*

TABLE 1. HAVE TO FLY IN CONNECTION WITH WORK

	Women % (n = 231)	**Men % (n = 250)**	**Total % (n = 481)**
No	55,0	25,2	39,5
Yes	45,0	74,8	60,5

A Chi-square test was conducted on have to fly in connection with work and women/men. Continuity correction=43,31, df=1 and asymp.sig=0,00. Men have to fly significantly more than women in connection with work, $p<0,05$.

Of the passengers, there were only 2,5% who had not flown during the last two years, whereas 8,2% had flown more than 50 times. 1,6% of the men and 3,5% of the women had not flown during the last two years. 3,2% answered that they had flown many times, but not the number of flights. We then assume that they have at least more than 10 flights during the last two years *(table 2).*

TABLE 2. NUMBER OF FLIGHTS LAST TWO YEARS

	Men %	**Women %**	**Total %**
0	1,6	3,5	2,5
1-10	33	55,8	44,1
11-20	23,5	25,1	24,3
21-50	23,9	11,3	17,7
More than 50	13,6	2,6	8,2
Many times, but not number of flights	4,5	1,7	3,2

A Chi-square test was conducted on number of flights last two years and women/men. Pearson chi-square=46,71, df=5 and asymp.sig=0,00. Men have significantly more number of flights last two years than women, $p<0,05$.

Statistical methods

Statistical tests included student's t-test to compare the mean scores of two different groups, chi-square tests to determine whether two categorical variables were related, Mann-Whitney U test for differences between two independent groups on a continuous measure, Kruskal-Wallis tests to compare the scores on some continuous variables for three or more groups, correlation analyzes to describe the strength and direction of the linear relationship between two variables and principal component analysis with Varimax rotation to determine factor structures.
$P<0,05$ was considered statistically significant.
The magnitude of the difference in the means was measured by Eta square.
According to the correlation analyzes, I used:

r < 0,29 small correlation
r 0,30-0,49 medium correlation
r > 0,50 large correlation

For some analyzes, flight anxiety is divided in three groups; grade 0, grade 1,2,3 and grade 4,5. Then we can compare those with no flight anxiety at all, those with some flight anxiety and those defined as flight phobics.

Data were analyzed using the statistical program SPSS version 15.

RESULTS

Prevalence of flight anxiety according to sociodemographic variables:

242 (50,8%) of the passengers answered that they were not afraid of flying at all. 221 (46,6%) of the passengers were grade 1-3, and 13 (2,8%) were grade 4 and 5. These passengers are defined to have flight phobia from our definition, 12 women and 1 man. 36,7% of the women answered that they were not afraid of flying at all. 58% grade 1-3. 5,3% grade 4 and 5 and are then defined having flight phobia. 64% of the men answered that they were not afraid of flying at all. 35,7% grade 1-3. 0,4% grade 5 and are then defined having flight phobia. No one of the men was grade 4 *(table 3.)*

TABLE 3. DEGREE OF FLIGHT ANXIETY ACCORDING TO SEX

	Women % (n=229)	**Men % (n=247)**	**Total % (n=476)**
Not afraid at all (Grade 0)	36,7	64	50,8
Sometimes a little afraid (Grade 1)	*45,4*	*30,4*	*37,8*
Always a little afraid (Grade 2)	*10*	*4,5*	*7,1*
Sometimes very afraid (Grade 3)	*2,6*	*0,8*	*1,7*
Always very afraid, but never cancel flights because of that (Grade 4)	***3,1***	***NA***	***1,5***
Always very afraid, and sometimes avoid flying because of that (Grade 5)	***2,2***	***0,4***	***1,3***

A Chi-square test was conducted on degree of flight anxiety and women/men. (Grade 0, grade 1,2,3 and grade 4,5). Pearson chi-square=40,48, df=2 and asymp.sig=0,00. Women are significantly more afraid of flying than men, p<0,05.

A Kruskal-Wallis Test was conducted on whether there is a difference in degree of flight anxiety across three age levels (<=29, 30-49 and 50+). Chi-square= 1,79, df= 2 and asymp.sig= 0,41. There is no significant difference, p> 0,05.

A Kruskal-Wallis Test was conducted on whether there is a difference in degree of flight anxiety across five levels of number of flights last two years (0, 1-10, 11-20, 21-50 and more than 50). Chi-square= 17,44, df= 4 and asymp.sig= 0,00. There is a significant difference, p< 0,05. An inspection of the mean ranks for the groups suggest that the group with no flights the last two years had the highest anxiety scores, mean rank 277,38, with the group with more than 50 flights reporting the lowest, mean rank 173,04.

310 of the passengers, 145 women and 165 men, answered the question whether they had become more afraid of flying after having children.173 (55,8%) had not become more afraid at all.101 (32,6%) had become a little to moderately more afraid, while 36 (11,6%) had become quite much to very much more afraid.
40,7% of the women had not become more afraid at all, 38% had become a little to moderately more afraid, while 21,4% had become quite much to very much more afraid after having children. For men, the numbers were 69,1%, 27,9% and 3% respectively. None of the men had become very much more afraid *(table 4).*

TABLE 4. MORE AFRAID AFTER HAVING CHILDREN

	Women % (n = 145)	**Men % (n = 165)**	**Total % (n = 310)**
Not at all	40,7	69,1	55,8
A little	29,0	21,8	25,2
Moderate	9,0	6,1	7,4
Quite much	11,7	3,0	7,1
Very much	9,7	NA	4,5

A Chi-square test was conducted on more afraid after having children according to sex. Pearson chi-square=37,75, df=4, asymp.sig=0,00. Women are significant more afraid than men after having children, p<0,05.

22 (4,5%) had cancelled at least one flight because of flight anxiety during the last two years, of those were 17 women and five men. Two of those passengers that were not afraid of flying at all, had avoided flying at least one time during the last two years. Of those with grade 1-3, 11 passengers had avoided flying at least one time and of those with flight phobia (grade 4-5) there were seven.

Totally, 58,3% of the passengers answered that they knew someone with flight anxiety.
Of those 242 without flight anxiety (grade 0), there were 55,4% that knew someone. Of the 221 with grade 1-3, there were 59,8% that knew someone with flight anxiety and of those 13 with flight phobia (grade 4-5), there were 10 (76,9%).

Three questions should only be answered by those who apprehend themselves as having flight anxiety. 1) How many years with flight anxiety , 2) more flight anxiety after frightening flight and 3) more afraid after having children:
84 (17,4%) answered the question how many years they had been afraid of flying. 56 women and 28 men. Of these 6 (7,1%) had been afraid less than 1 year. 19 (22,6%) had been afraid 1-9 years and 59 (70,2%) had been afraid for more than 10 years (*table 5).*

TABLE 5. NUMBER OF YEARS WITH FLIGHT ANXIETY

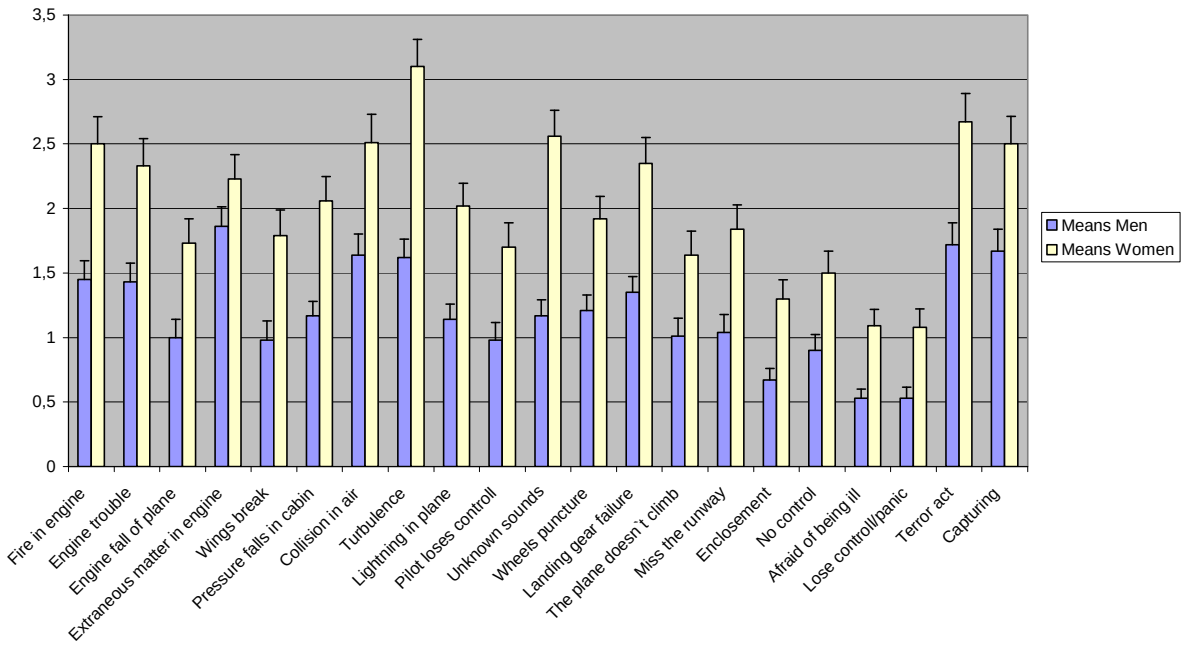
	Women % (n = 56)	Men % (n = 28)	Total % (n = 84)
< 1 year	3,6	14,3	7,1
1-2 years	5,4	7,1	6,0
3-5 years	7,1	10,7	8,3
6-9 years	10,7	3,6	8,3
≥ 10 years	73,2	64,3	70,2

94 (19,4%) of the passengers answered the question about more flight anxiety after a frightening flight. 35 (37,2%) answered yes. Of these 23 were women and 12 men.
79 (16,3%) of the passengers answered the question whether they had been more afraid after having children. 44 (55,7%) answered yes, of these 37 (69,8%) were women and seven (26,9%) men.

What kinds of situations make concern during flights that are not related to flying?

The mean score for the passengers according to different situations that make concern during flights is 1,6. The items with the highest score (mean) are: turbulence 2,3, terrorism 2,2, high jacking 2,1, collision in air 2,1 and extraneous matter in engine 2,0.
For women the mean is 2,0. The items with highest score are: turbulence 3,1, terrorism 2,7, unknown sounds 2,6, collision in air 2,5 and high jacking 2,5
For men the mean is 1,2. The items with highest score are: extraneous matter in engine 1,9, high jacking 1,7, terrorism 1,7, collision in air 1,6 and turbulence 1,6 *(figure 1).*

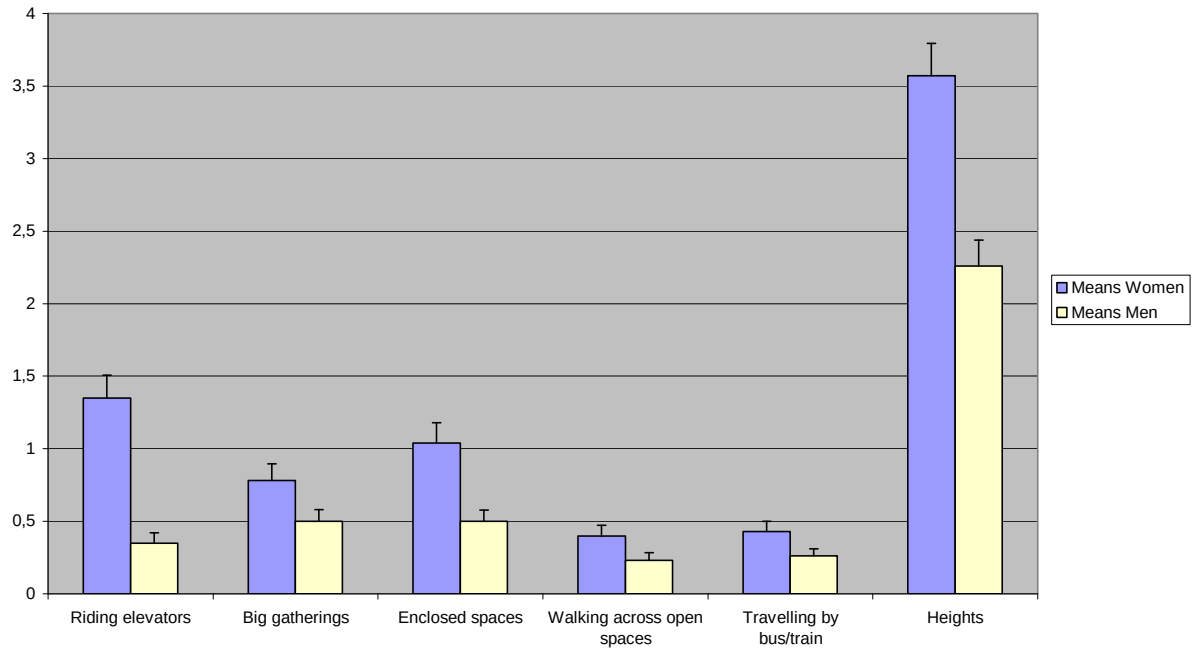
Figure 1. Discomfort during flights according to sex (Mean and Std.Error)



An independent-samples t-test was conducted to compare the *mean for different situations* for males and females. There was significant difference in scores for males (M=1,19, SD=1,43) and females [M=2,02, SD=2,12; t(368,09)=4,76, p=0,00] The magnitude of the difference in the means was moderate (Eta squared=0,05).

The mean for the passengers according to anxiety in situations other than flying is 1,0. Heights stand out from the other items with mean 2,9, followed by riding elevators 0,8 and enclosed spaces 0,8. For women the mean is 1,3. The mean for heights is 3,6, followed by riding elevators 1,6 and enclosed spaces 1,0. For men the mean is 0,7. The mean for heights is 2,3, followed by big gatherings 0,5 and enclosed spaces 0,5 *(figure 2).*

Figure 2. Degree of anxiety in situations other than flying (Mean and Std.Error)



An independent-samples t-test was conducted to compare the *mean of anxiety in situations other than flying* for males and females. There was significant difference in scores for males (M=0,68, SD=0,80) and females [M=1,26, SD=1,32; t(357,52)=5,64, p=0,00] The magnitude of the difference in the means was moderate (Eta squared=0,07)

A principal component analysis with Varimax rotation was made. Three factors emerged with Eigenvalue above 1 *(table 6).* The first was technical concerns (12 items with Cronbachs alfa 0,96) with Eigenvalue 12,24, explaining 36,1% of the variance. The second factor was claustrophobia/uncontrollable external events (7 items with Cronbachs alfa 0,87) with Eigenvalue 1,54, explaining 22,7% of the variance, and the third factor high jacking/terrorism (2 items with Cronbachs alfa 0,97) with Eigenvalue 1,12, explaining 12,2% of the variance. In total 70,9% of the variance was explained. The scree plot clearly confirmed the first two factors, whereas the third was less convincing *(figure 3).* Even though the factor loadings were rather clear also for the third factor, this factor is not an independent factor. The factor has a low eigenvalue and is not confirmed on the scree plot. Therefore, we consider that we have two factors, technical concerns and claustrophobia/ uncontrollable external events, explaining 65,6% of the variance.

TABLE 6. Factor analysis with eigenvalues, and explained variance

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	12,237	58,273	58,273	12,237	58,273	58,273	7,576	36,077	36,077
2	1,543	7,346	65,619	1,543	7,346	65,619	4,764	22,687	58,764
3	1,118	5,324	70,942	1,118	5,324	70,942	2,557	12,178	70,942

Extraction Method: Principal Component Analysis.

Figure 3. Scree plot for the principal component analysis

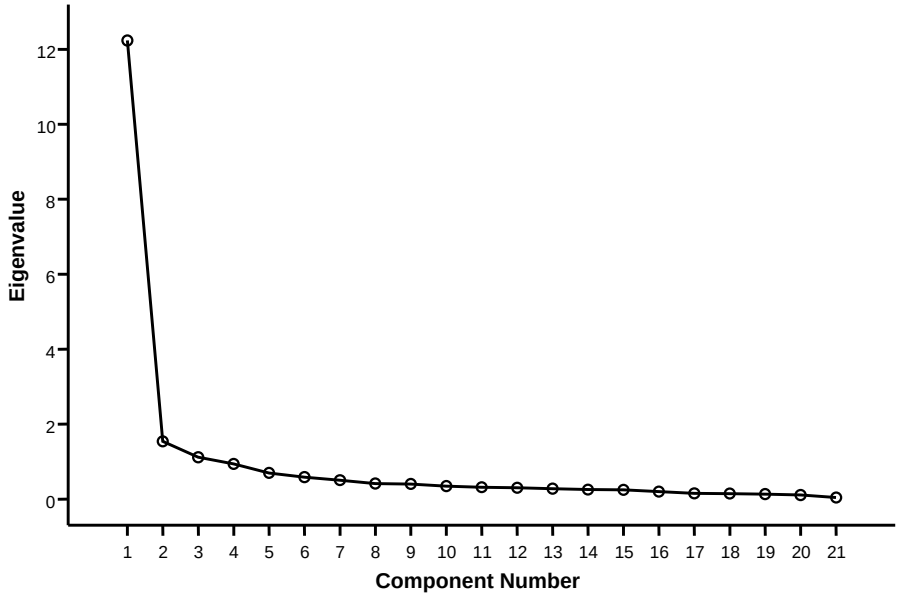


TABLE 7. Rotated Component Matrix(a)

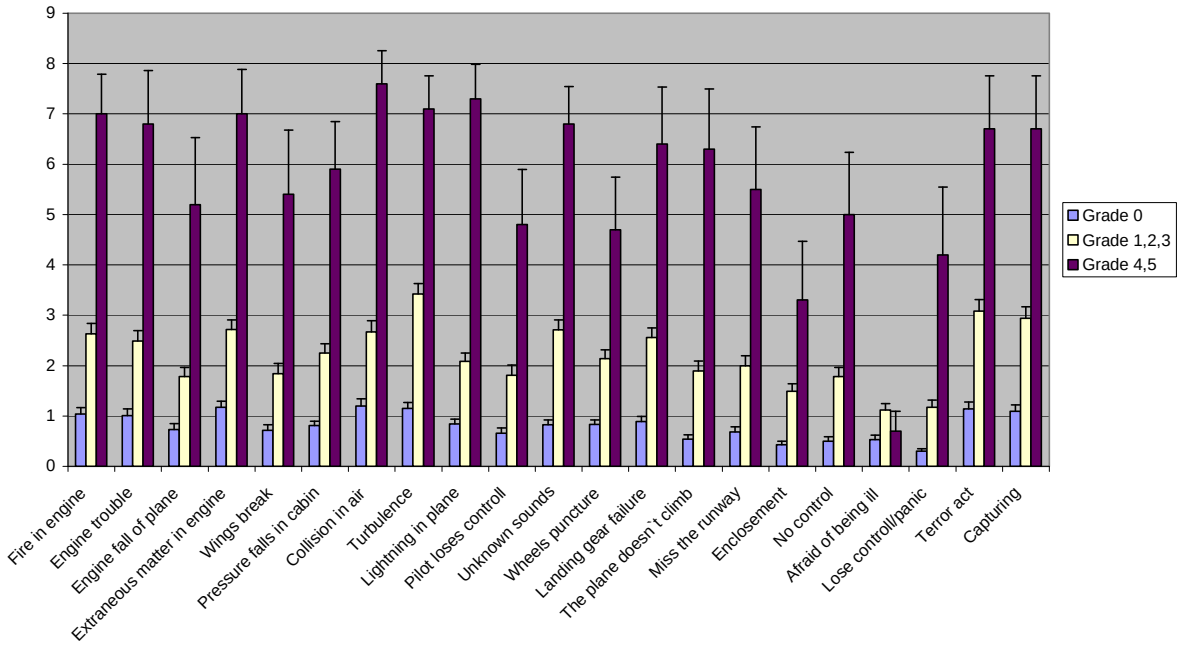
	Component		
	1	2	3
Wings break	,859		
Engine fall of plane	,843		
Pilot loses controll	,799	,311	
Engine trouble	,787		
Collision in air	,737		,368
Plane doesn't climb	,727	,407	
Miss the runway	,716	,366	
Fire in engine	,704	,312	,368
Landing gear failure	,692	,447	
Wheels puncture	,676	,479	
Pressure falls in cabin	,636	,445	
Extraneous matter in engine	,635	,411	
Enclosement		,748	
No control	,303	,724	

Lose control/panic		,700	,356
Afraid of being ill		,684	
Lightning in plane	,490	,649	
Turbulence	,401	,627	
Unknown sounds	,452	,590	
Terror act	,351		,877
High jacking	,357		,874

Extraction Method: Principal Component Analysis.
Rotation Method: Varimax with Kaiser Normalization.
a Rotation converged in 5 iterations.

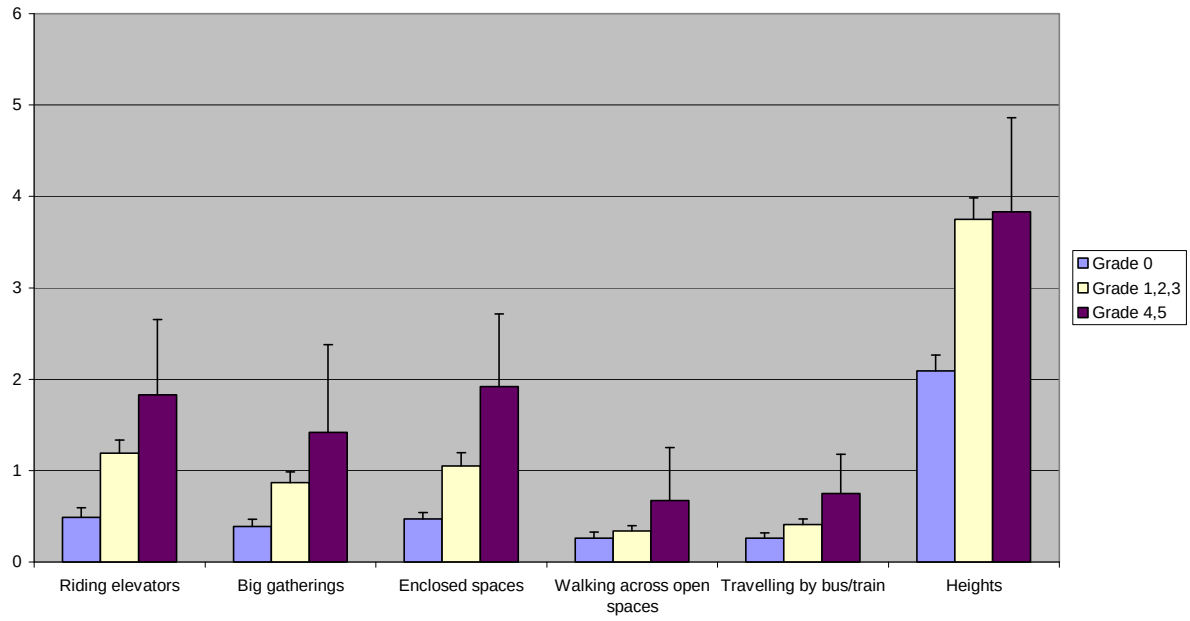
The mean for situations that cause concern during flights for the passengers with no flight anxiety at all (grade 0) is 0,8. The items with highest score (mean) are: collision in air 1,2, extraneous matter in engine 1,2, turbulence 1,2, terrorism 1,1 and high jacking 1,1.
For those with grade 1,2 and 3 the mean is 2,2. The items with highest score are: turbulence 3,4, terrorism 3,1, high jacking 2,9, extraneous matter in engine 2,7 and collision in air 2,7.
For those with grade 4 and 5 the mean is 5,7. The items with highest score are: collision in air 7,6, lightning in plane 7,3, turbulence 7,1, extraneous matter in engine 7 and fire in engine 7.
The mean for terrorism and high jacking are for both 6,7. The only item that stands out from the others is afraid of being ill, mean 0,7 *(figure 4).*

Figure 4. Discomfort during flights according to degree of flight anxiety (Mean and Std.Error)



The mean for those with flight anxiety grade 0 according to anxiety in other situations than flying is 0,7. Heights stand out from the other factors with mean 2,1, followed by riding elevators 0,5 and enclosed spaces 0,5.
The mean for those with grade 1,2 and 3 is 1,3. Heights 3,8, followed by riding elevators 1,2 and enclosed spaces 1,1.
The mean for those with grade 4 and 5 is 1,7. Heights 3,8, followed by enclosed spaces 1,9 and riding elevator 1,8 *(figure 5).*

Figure 5. Degree of anxiety in situations other than flying according to degree of flight anxiety (Mean and Std.Error)



The relationship between *the mean for anxiety in situations other than flying* and *degree of flight anxiety* was investigated using Pearson product-moment correlation coefficient. There was a medium, positive correlation between the two variables [r=0,31, n=450, p<0,00], with an increasing degree of anxiety related to other phobics associated with a increasing degree of flight anxiety.

Passengers opinion about safety and flight accidents:

On the question whether the passengers feel that airline companies and airport staff do enough to ensure safety, 15,7% of the passengers mean that they do nothing at all or just a little. Women more than men have this opinion, 20,3 % of the women and 11,4% of the men *(table 8).*

TABLE 8. Confidence that airline companies and airports do enough to ensure safety

	Women % (n = 202)	**Men % (n = 219)**	**Total % (n = 421)**
Not at all	6,9	4,1	5,5
A little	13,4	7,3	10,2
Moderate	27,2	23,7	25,4
Quiet much	39,1	42,9	41,1
Very much	13,4	21,9	17,8

The passengers were also asked about their opinion about frequency of flight accidents. 5,1% believe that the frequency is 1 per 10 000 flights or more often and 70,9% believe that the frequency is from 1 per 1 000 000 to 1 per 10 000 000 flights (*table 9).*

TABLE 9. OPINION ABOUT FREQUENCY OF FLIGHT ACCIDENTS

	Women % (n = 207)	Men % (n = 243)	Total % (n = 450)
1 per 100 flights	1,9	,4	1,1
1 per 1000 flights	1,0	,8	,9
1 per 10 000 flights	3,4	2,9	3,1
1 per 100 000 flights	15,0	9,9	12,2
1 per 1000 000 flights	**36,2**	**31,3**	**33,6**
1 per 10 000 000 flights	**31,4**	**42,4**	**37,3**
1 per 100 000 000 flights	11,1	12,3	11,8

A Chi-square test was conducted on the opinion about frequency of flight accidents and women/men. (1 per 10 000 or more often combined.) Pearson chi-square=7,98, df=4 and asymp.sig=0,09. There is no significant difference between women and men according to opinion about frequency of flight accidents, p>0,05.

Table 10 shows the opinion about frequency of flight accidents according to degree of flight anxiety in three groups.

TABLE 10. OPINION ABOUT FREQUENCY OF FLIGHT ACCIDENTS

	Grade 0 % (n = 229)	Grade 1-3 % (n = 207)	Grade 4-5 % (n = 9)
1 per 100 flights	,9	1,0	NA
1 per 1000 flights	1,3	NA	11,1
1 per 10 000 flights	2,6	2,9	22,2
1 per 100 000 flights	9,6	15,5	11,1
1 per 1 000 000 flights	**31,9**	**35,7**	**11,1**
1 per 10 000 000 flights	**38,0**	**37,7**	**22,2**
1 per 100 000 000 flights	15,7	7,2	22,2

The relationship between *the opinion about frequency of flight accidents* and *degree of flight anxiety* was investigated using Pearson product-moment correlation coefficient. There was a small, negative correlation between the two variables [r=-0,13, n=445, p<0,01], with an increasing degree of flight anxiety associated with an opinion about increasing frequency of flight accidents.

Among the passengers there were 6,9% that believed that from 0-10% perished. 8,8% believed that from 41-60% perished and 42,7% from 91%-100%. There were no significant difference between men and women (*table 11).*

TABLE 11. PERCENT THAT PERISHES

Perish %	Women % (n = 207)	Men % (n = 239)	Total % (n = 446)
0	4,8	2,9	3,8
1-10	2,5	3,7	3,1
11-20	1,4	2,1	1,8
21-30	1,0	0,8	0,9
31-40	2,9	1,7	2,2
41-50	**3,4**	**8,4**	**6,1**
51-60	**2,4**	**2,9**	**2,7**
61-70	3,4	4,2	3,8
71-80	13,0	12,9	13,0
81-90	17,9	21,3	19,7
91-99	20,7	19,6	20,1
100	26,6	19,2	22,6

A Mann-Whitney U test was conducted to compare the *opinion about percent perishes* for males and females. Z=-1,59 and asymp.sig.= 0,11. There was no significant difference for males and females, p>0,05.

More flight anxiety after the terror act September 11, 2001?

After the terror attacks against the World Trade Center and Pentagon, USA on September 11, 2001, 4,8% of the passengers have been quite much, or very much more afraid of flying. 47,8% have not been more afraid at all. More women than men have been quite much to very much more afraid of flying, respectively 8,7% and 1,3%. 34,6% of the women and 60,0% of the men have not been more afraid at all *(table 12).*

TABLE 12. MORE FLIGHT ANXIETY AFTER WTC 11.09.2001

	Women % (n = 208)	Men % (n = 225)	Total % (n = 433)
Not at all	34,6	60,0	47,8
A little	42,8	32,9	37,6
Moderate	13,9	5,8	9,7
Quite much	**5,8**	**0,9**	**3,2**
Very much	**2,9**	**0,4**	**1,6**

A Chi-square test was conducted on more afraid after September 11, 2001 and men/women. Pearson chi-square=36,75, df=4 and asymp.sig=0,00. Women are significantly more afraid than men after September 11, 2001, p<0,05.

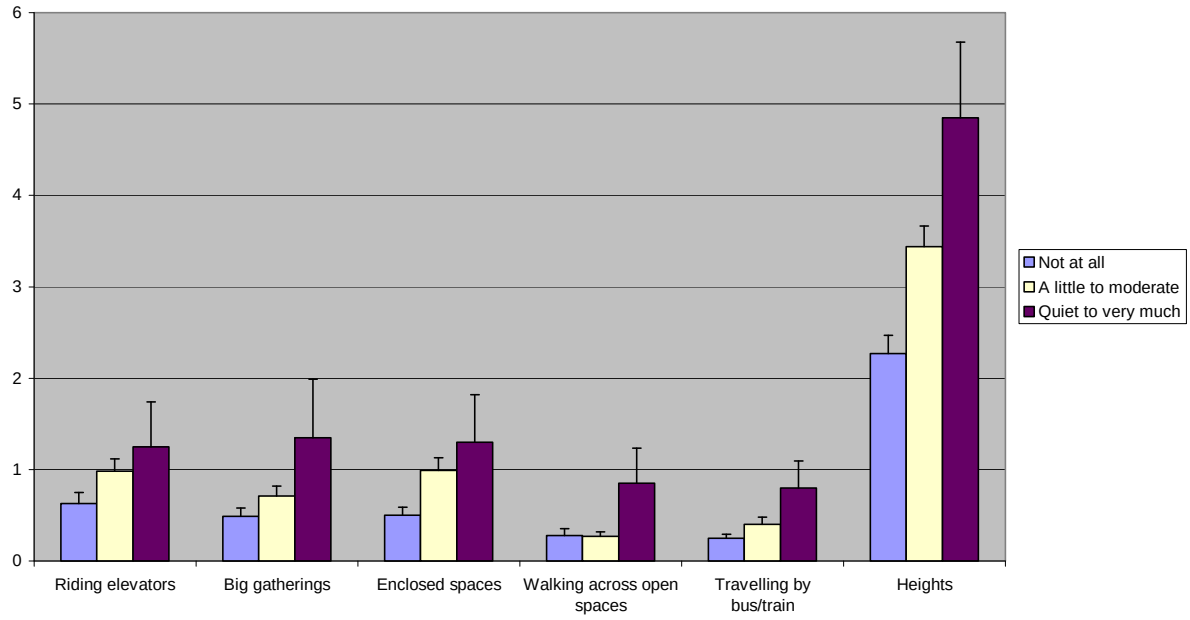
A Kruskal-Wallis Test was conducted on whether there is a difference in more afraid after September 11 across three age levels (<=29, 30-49 and 50+). Chi-square= 1,29, df= 2 and Asymp.Sig= 0,53. There is no significant difference, p> 0,05.

A Kruskal-Wallis Test was conducted on whether there is a difference after September 11 across five levels of number of flights last two years (0, 1-10, 11-20, 21-50 and more than 50). Chi-square= 17,80, df= 4 and asymp.Sig= 0,00. There is a significant difference, p< 0,05. An inspection of the mean ranks for the groups suggest that the group with no flights the last two

years had the highest anxiety scores, with the group with more than 50 flights reporting the lowest.

A Kruskal-Wallis Test was conducted on whether there is a difference in mean for situations other than flying across three anxiety levels after September 11 (not at all, a little to moderate and quite to very much). Chi-square= 24,21, df= 2 and asymp.Sig= 0,00. There is a significant difference, p< 0,05. An inspection of the mean ranks for the groups suggest that the most afraid group had the highest anxiety scores in other situations, with the group with no anxiety at all reporting the lowest *(figure 6).*

Figure 6. Degree of anxiety in situations other than flying according to degree of anxiety after September 11, 2001 (Mean and Std.Error)



Are Norwegian airline passengers more afraid of flying now than in 1986?

A comparison of our study 2002 and the study made in 1986, Ekeberg et al. (1). Notice, the studies includes different passengers *(table 13).*

TABLE 13. Degree of flight anxiety among Norwegian airline passengers in 1986 and 2002

	1986% (n=300)	**2002% (n=476)**
GRADE 0	52	51
GRADE 1	36	38
GRADE 2	8	7
GRADE 3	2	2
GRADE 4	1	2
GRADE 5	1	1

The table shows that the passengers are not more afraid of flying now than in 1986. Nor have the proportion with flight phobia increased.

DISCUSSION

49,4% of the passengers reported some degree of flight anxiety. Only 2,8% were defined as flight phobics (grade 4 and 5). This means that many passengers experience some discomfort when flying, often related to special situations, but not so much that they are defined as having flight phobia. Because only those passengers with grade 4 and 5 are defined as having flight phobia, we have set the limit for flight phobia at a high level. The numbers of passengers we get are minimum numbers. Generally, passengers will set the limit at a lower degree and because of that include more people in the definition.
Many of the passengers answer that they have been afraid of flying for a long time, but only few are defined as having flight phobia. 22 (4,5%) had cancelled at least one flight because of anxiety for flying during the last 2 years. Under the terms of our definition, these passengers then are grade 5. 84 (17,4%) answered the question of how many years they had been afraid of flying. 59 (70,2%) had been afraid for more than 10 years. But only 13 are defined as having flight phobia. The fact that more passengers answer these questions indicates underreporting of flight anxiety.

It might be difficult to compare with other studies, because the definition of flight anxiety may vary. This decide which of the subjects that become included and not.
Some of the studies use the DSM-IV criteria (2) and will then just include those who fulfil these criterias as having flight phobia. The studies also vary in the way they are carried out. Probably, people will answer in different ways whether they answer a questionnaire at home or onboard a plane. The data from the study of Ekeberg et al (1) indicates that women answered about the same whether they completed the questionnaire at home or during flight, whereas men seemed to underreport when answering at home.
Fredrikson et al. (7) defined phobia from the criterias in DSM-IV (2). They also used a VAS-scale 0-100, where 0= no fear at all and 100= maximal fear. The subjects were randomly selected from a population based registry. A questionnaire was mailed together with a stamped return envelope. We se differences both in the way the subjects are chosen, the criteria and the use of a VAS-scale. Only those with phobia defined as in DSM-IV were included. The study says nothing about other degrees of flight anxiety. Based on these criteria, these subjects will correspond with our subjects defined grade 4 and 5. Fredrikson et al.(7) found 2,6% flight phobics, in our study we found 2,8%. So, about the same numbers of subject are defined having flight phobia in these two studies.
Ekeberg et al.(1) used the same questionnaire and criteria as in the present study. And importantly, the study is made among passengers during flight. This gives a good comparison, and the study found 48% with some flight anxiety, and 2% flight phobics.

Women who fly are significantly more afraid than men. Generally, concerning the degree of flight anxiety, they are also more afraid after having children. Women also feel more discomfort than men during flight related to different situations and they also have more anxiety than men in situations other than flying. This is in accordance with the fact that symptoms of phobias and anxiety are more common among females than men (2). To be afraid and having a phobia are not the same, but they reflect different levels of the same phenomenon. Maybe the women are more willing to admit anxiety and phobia. Another reason may also be that men fly more often than women. 74,8% of the men and 45% of the women have to fly in connection with work and most of the passengers that had flown more than twenty times during the last two years were men. It is probably that those who fly most have least flight anxiety, because of practising. Totally 8,2% had flown more than fifty times during the last two years, it is most likely that these passengers fly in connection with work.

In our study; turbulence, terrorism and high jacking caused most concern during flight and nearly at the same degree. The finding that turbulence has a high score is in accordance with earlier studies, Ekeberg et al.(1) and Ekeberg et al.(3).
The principal component analysis with Varimax rotation emerged with three factors with eigenvalue above 1, technical concerns, claustrophobia/uncontrollable external events and high jacking/terrorism. Even though the factor loadings were rather clear also for the third factor, high jacking/terrorism, this is not considered as an independent factor. Because of a low eigenvalue, 1,12, and that the scree plot just confirm two factors, high jacking/terrorism is not included as an own factor. The two factors are then technical concerns and claustrophobia/uncontrollable external events, explaining 65,6% of the variance.
Heights caused far the most discomfort for both sexes according to anxiety in situations other than flying, and particularly in the females. This also agrees with phobia and anxiety being more common among females than men (2). This correlates with earlier studies, Ekeberg et al (1) and Ekeberg et al.(3). We also found that discomfort during flights and in other situations correlated significantly with the flight anxiety score. A higher flight anxiety score gave a higher score for anxiety in the other situations.

The passengers were asked about their opinion about the frequency of flight accidents. The frequency of flight accidents is less than one in one million (14). So 70,9% of the passengers have a realistic opinion of how often accidents happen. 5,1% believe that the frequency is 1 per 10 000 flights or more often, what is quite unrealistic.
About 50% perish in a flight accident (14). Among the passengers, there were 8,8% who believed that from 41%-60% perished. 52,8% believed that over 70% perished. Men and women answered quite the same.

The impact of September 11 is rather moderate, 4,8% of the passengers were quite much to very much more afraid after the event. Women were significantly more afraid than men. This was not very different from having children, whereas 11,6% of the passengers were quite much to very much more afraid.
Gigerenzer (13) writes that people tend to avoid situations in which many people may be killed at one point in time; as opposed to situations in which the same number may be killed, but the deaths are distributed over a longer period of time. The crash of four planes in the terrorist attack of September 11, 2001, exemplifies such a catastrophic event. Millions of Americans stopped or reduced their air travel. For instance, the national revenue passenger miles decreased in October, November and December 2001, by 20%, 17% and 12% respectively, compared with the same months in 2000. Decline in airline passengers after September 11, is also found by Ito et al.(12).
What may be a reason to this decline in airline passengers? Are people afraid for terrorism or are people afraid of flying? The reason is most probably fear for terrorism. Now the numbers of airline passengers have increased, and the prevalence of flight anxiety has not increased. This correspond with the findings of no evidence for an increase in fear of flying among Germans, made by Mühlberger et al.(11).
The concern about terrorism is comparable to turbulence and foreign sounds.

The degree of flight anxiety among Norwegian passengers is the same in 2002 as in 1986. The same questionnaire and method are used. Norwegian airline passengers are therefore not more afraid now than in 1986. The numbers of those who are afraid has not increased. This indicates that attribution is important, and that the passengers attribute their anxiety to terror acts like September 11, or other possible events. So, what the passengers are afraid of may have changed a bit. Now, they are maybe less afraid of technical things, but maybe more

afraid of terrorism/high jacking. Today, the safety associated with flights and airports is even better than in the eighties, where the last study was conducted. The number of flights has also increased a lot.

A strength with our study is that the questionnaires were distributed onboard the airplanes. It is most likely to believe that passengers answers more correct according to flight anxiety when they are in the situation. Because the same questionnaire and method are used in this study as in the last study (1), the two studies are easy to compare. 79,9% of the passengers did answer the questionnaire. A high response rate is also a strength. Maybe some of those with flight anxiety would not answer the questionnaire or maybe some of the men with flight anxiety would not admit that they were afraid. The questionnaires were also only distributed on Norwegian domestic flights. At that time Braathens, the present SASBraathens, is the same airline company as at the last study by Ekeberg et al. (1), and as mentioned, only domestic flights were studied. This may also have influenced our results. Most likely, those who travel on international flights are less afraid of flying, as those with flight anxiety are more reluctant to make longer flights. Are there differences between those who fly with Braathens compared to other airline companies? This has not been studied. It is, however, a general finding that familiar situations cause less concern. Accordingly, flying with domestic airlines most likely cause less concern. In addition, most passengers have an idea about the quality of the airline companies. Therefore, most international airline companies from developed countries seem safer than smaller companies from developing countries.

New studies of current interest that ought to be done might be the prevalence of flight anxiety among Norwegian passengers and flights abroad, and prevalence of flight anxiety among passengers in other countries. It would also be interesting to study prevalence of flight anxiety in countries that have experienced flight accidents. Countries that have experienced different kinds of terror acts should also be a topic of interest.

Conclusion:
Women are more afraid of flying than men. They also feel more concern during flight. The concern about terrorism is comparable to turbulence and foreign sounds.
The impact of September 11 is rather moderate, and not so different from having children. However, the increased flight anxiety that was global shortly after September 11 seems to have disappeared in Norway, even though some passengers attribute their anxiety to that event.
The prevalence of flight anxiety among Norwegian passengers is the same in 2002 as it was in 1986.

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